

Coastmap CLIENT

Version 4.3

User Manual



Applied Science Associates, Inc.
70 Dean Knauss Dr.
Narragansett, Rhode Island 02882

<http://www.appsci.com>

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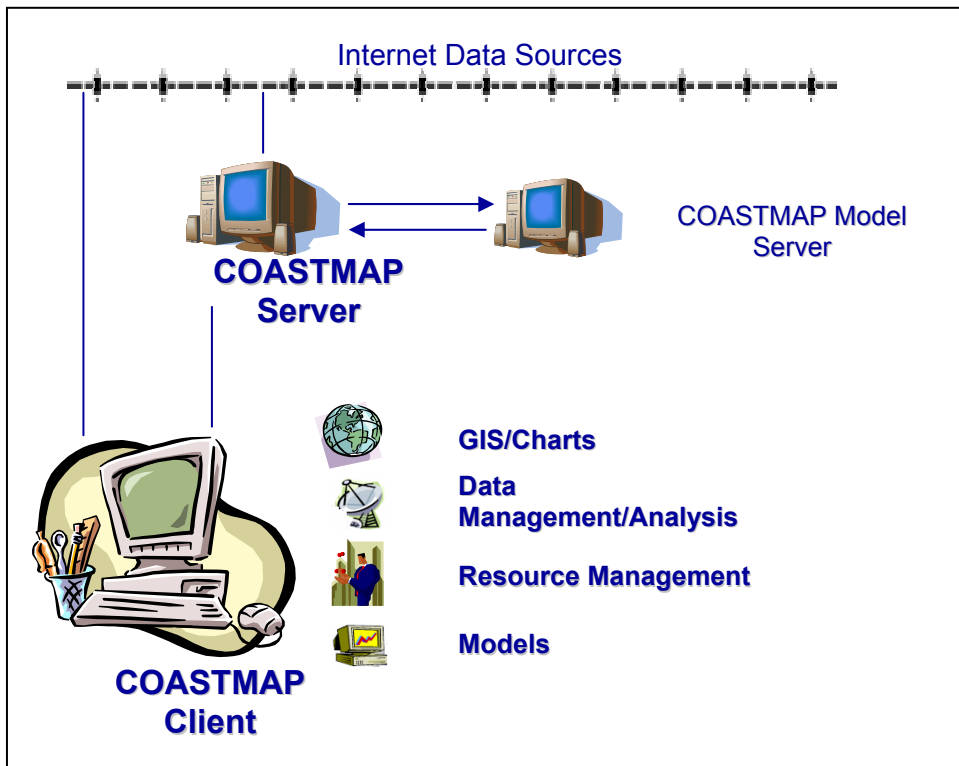
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1. Introduction

1.1 About Coastmap

COASTMAP is a decentralized Internet based application consisting of a series of COASTMAP Clients and the Data Server with an associated Model Server. The system architecture allows for a robust and highly scalable application allowing multiple data servers for varying levels of environmental data access and user needs. Coastmap clients communicate with data servers by Internet protocols, hence the system is highly portable in that users can access the system anywhere an Internet connection is available.



1.2 Installing Coastmap

To install the Coastmap client, the software requires an IBM-compatible 486 or better PC with at least 64MB RAM, 100MB free disk space on the hard drive, a VGA color monitor, a Microsoft-compatible mouse, and Microsoft Windows NT, Windows 95, Windows 98, Windows 2000, or Windows XP.

Install Coastmap:

1. Insert the installation CD.
2. Using Windows Explorer, run the SETUP.EXE on the CD.
3. Follow the instructions on the screen.
4. When installation is complete, you will have a new program group labeled Coastmap, with an icon for the Coastmap system.

1.3 This Manual

This manual is intended to provide the Coastmap user with all the necessary information to get started quickly with using Coastmap's main components. The following chapter, *Quick Start*, gives a description of the most important features in Coastmap. It should give a good overview and enable the user to download, graph, analyze and manipulate data from different sources, as well as use Coastmap's other features for particle modeling and ship-track simulation.

For more details about the fundamentals of the program's interface, chapters 3 and 4 provide details about the embedded Geographic Information System (GIS) and display options in Coastmap. These might be especially useful to users unfamiliar with GIS-based applications and for those who want to find out about specific details of the interface. Finally, section 5 provides information on advanced GIS and interface abilities in Coastmap, useful for reference and fine-tuning Coastmap for a particular location.

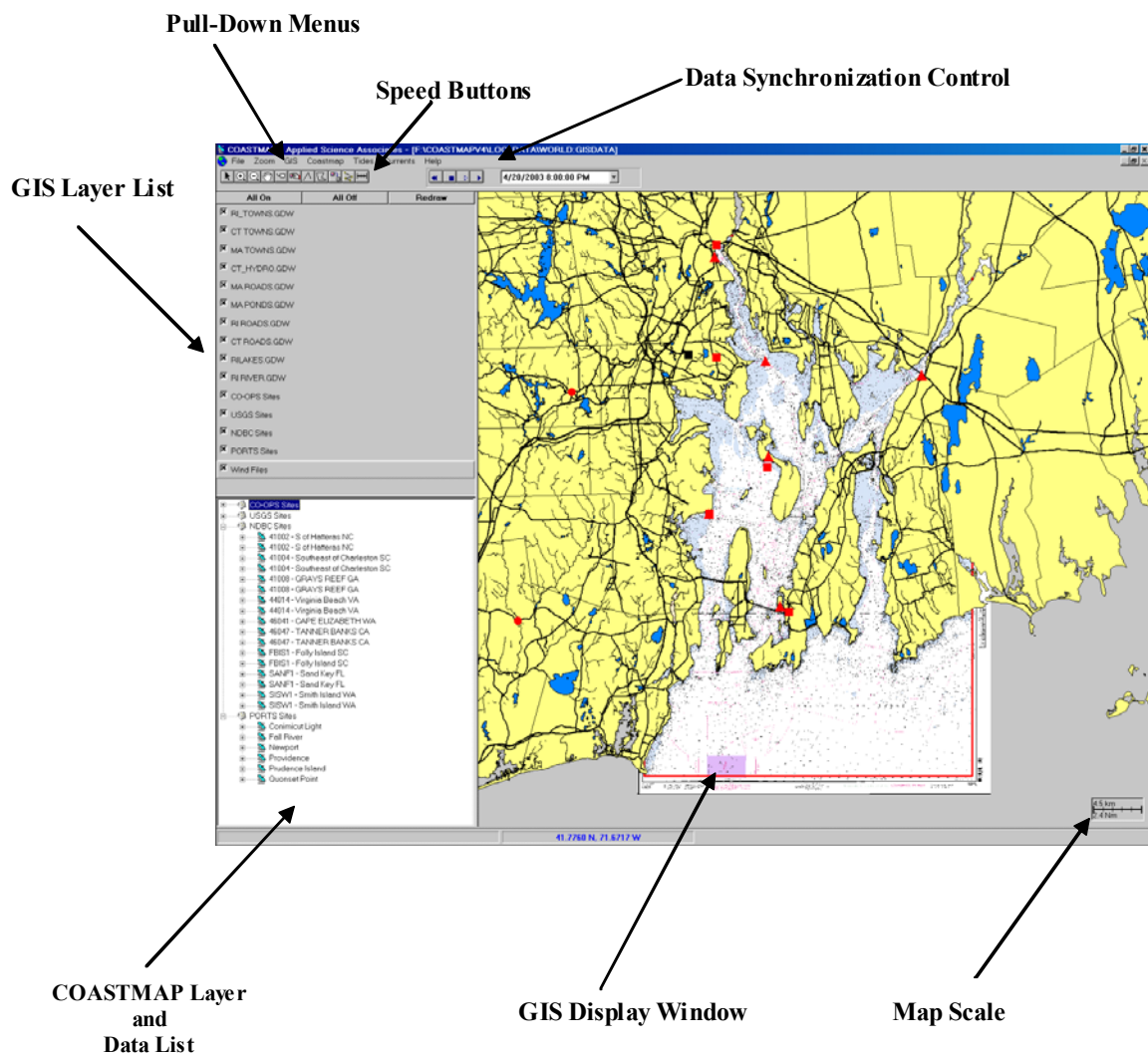
1.4 Technical Support

Technical support is available for Coastmap users from 9:00 A.M. to 5:00 P.M. eastern time, Monday through Friday; phone (800) 780-6224 or fax (401) 789-1932. Coastmap support questions may also be sent via e-mail to asa@appsci.com.

2. Quick Start: A Comprehensive Overview

This section should provide enough information to use the data collection, storage, analysis and visualization elements of Coastmap, as well as the map and display features. Any topics that are not explained in-depth in this chapter are described in more detail in the subsequent parts of the manual.

2.1 Coastmap Interface Overview



2.1.1 GIS Display Window

The Coastmap GIS Display Window provides a simple and intuitive interface to much of the application's functionality. The map displays the land and water features for the active geographic location. Using the GIS tools in the GIS toolbar, a user can create and modify objects on the map. The map can be panned, zoomed in and out, and modified by adding or removing layers. Map colors can be controlled by right-clicking in the map area and selecting the *Map Display Settings* option, or by choosing *Display Settings* from the File menu, or by pressing *CTRL-D*.

2.1.2 GIS Layer List

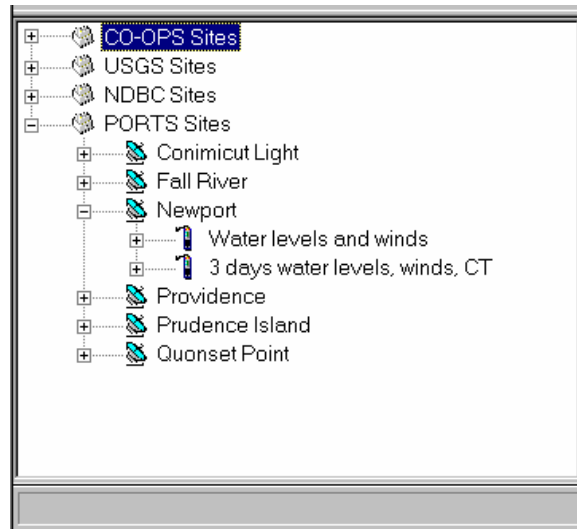
The GIS Layer List, located to the left of the interface, provides easy access to all of the GIS layers loaded into the location. Layers can be on or off (indicated by the checkbox to the left of the layer's name) and active or passive. Only one layer may be active at a time, and the currently-active layer is raised in the layer list. All GIS actions, such as adding, modifying, or deleting GIS objects, are performed on the active layer.

To modify which layers are currently displayed on the map, check or uncheck each layer's on/off box and then click the **Redraw** button at the top of the layer list. To automatically set all layers on or off, click either the **All On** or **All Off** buttons at the top of the list.

2.1.3 Coastmap Layer and Data List

The Coastmap Layer and Data List, located below the GIS Layer list and to the left of the GIS Display Window, provides an interface to all the available station layers in the current location. Each station layer can be expanded by clicking on the plus sign to the left of its name, and then collapsed by clicking on the minus sign. When expanded, all the available stations within the station layer are displayed, and each station can be further expanded to display all the available sensors.

The sensors, in turn can be expanded to show the channels, which contain the actual data. Each channel contains a time series of one variable.



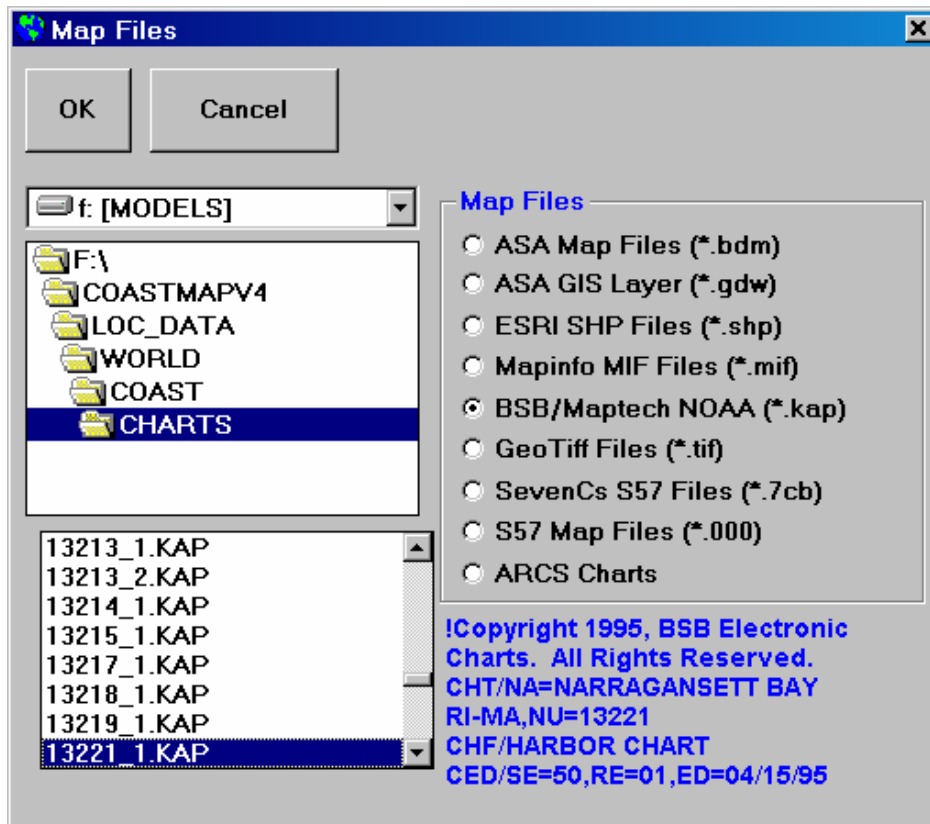
2.1.4 Basemap

The basemap is the fundamental geographic data of the Coastmap interface. All other data is displayed upon this map. The basemap can be derived from a number of common data sources and include:

- ASA map files
- ESRI shapefiles
- Mapinfo files
- BSB raster nautical charts
- Geographically referenced TIFF files
- S57 vector nautical charts

To change the basemap:

- from the File pull-down menu choose the Basemap option
- The form shown below will appear
- Choose the type of basemap from the map files panel of the right side of the form
- Use the directory navigation tools on the left side of the form to choose the desired map file.



2.2 Real-Time Data Products from Outside Sources

Coastmap provides access to many real-time data sources including:

- National Weather Service Data Link
- Satellite Images
- NOAA CO-OPS Data
- US Geological Survey Data
- NOAA Physical Oceanographic Real-Time System (PORTS) Data
- NOAA Offshore Marine Data Buoys
- Coastal/Ocean Forecasts (Covered in section 2.3)
- Wave Forecasts (Covered in section 2.3)
- Meteorological Forecasts (Covered in section 2.3)

2.2.1 National Weather Service Data Link

This link provides access to aviation weather forecasts from airports throughout the world. The forecasts can be accessed by selecting the NWS Weather Forecast from the Coastmap pull-down menu. An available data list can be generated referenced from the center of the basemap or by choosing

the country of interest. Once the data is downloaded it is readily available to all imbedded modeling systems.

National Weather Service Data Link

Search Options

☒ From Center of Map

100 Nm. Search

☐ By Country

Providence, Green State Airport

Hyannis, Barnstable Municipal-Boardman Airport
Nantucket, Nantucket Memorial Airport
Boston, Logan International Airport
Worcester, Worcester Regional Airport
Windsor Locks, Bradley International Airport
Westfield, Barnes Municipal Airport
Bridgeport, Sikorsky Memorial Airport
Manchester, Manchester Airport
Islip, Long Island Mac Arthur Airport
Pease Air Force Base / Portsmouth

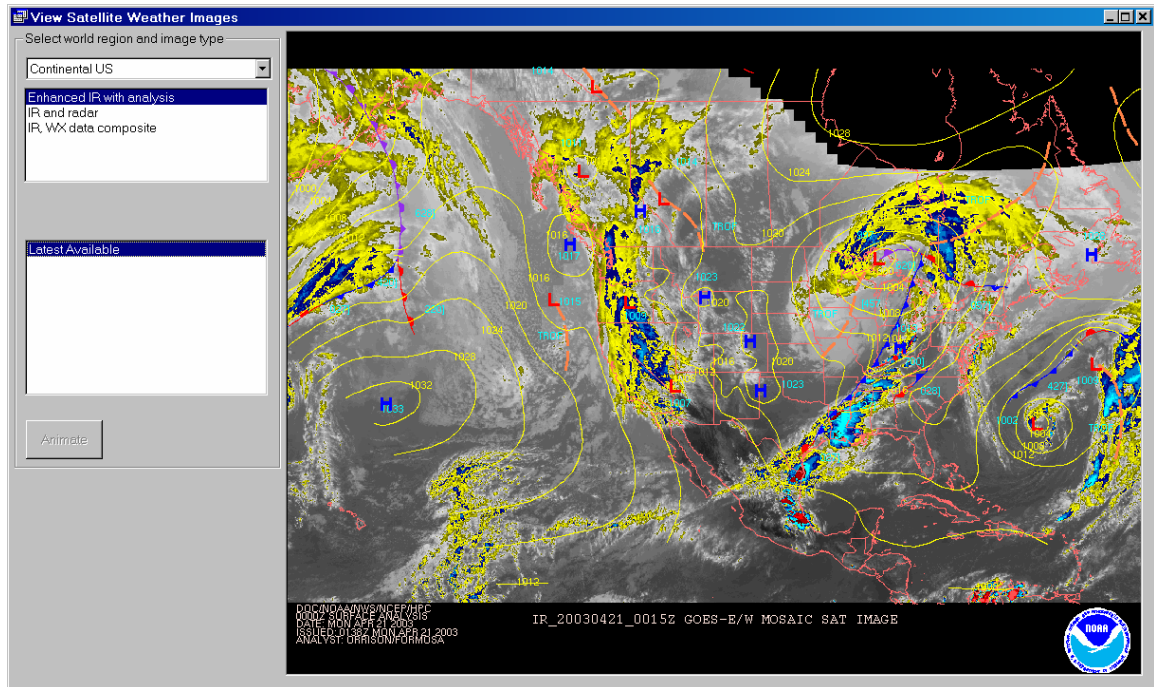
Offset From GMT -5 Get Data

Station KPVD. Raw data: 2003/04/20 23:20KPVD 202320Z 210024 10008KT P6SM BKN250 FM0800 03004KT P6SM BKN250 FM1300 10008KT P6SM SCT150 BKN250 FM2200 14008KT P6SM SCT018 BKN040

Observation date: April 20, 2003
Observation time: 11:20 PM GMT
Station: Providence, Green State Airport (KPVD)
Observation day/time: 20th day of the month at 11:20 PM GMT.
Forecast valid from the 21st at 00:00 AM until the 22nd at 12:00 PM
Wind from 100 degrees at 08 knots.
Visibility unlimited.
Broken clouds at 25000 feet.
After 08:00 AM:
Wind from 030 degrees at 04 knots.
Visibility unlimited.
Broken clouds at 25000 feet.
After 1:00 PM:
Wind from 100 degrees at 08 knots.
Visibility unlimited.
Scattered clouds at 15000 feet.
Broken clouds at 25000 feet.
After 10:00 PM:
Wind from 140 degrees at 08 knots.
Visibility unlimited.
Scattered clouds at 1800 feet.
Broken clouds at 4000 feet.

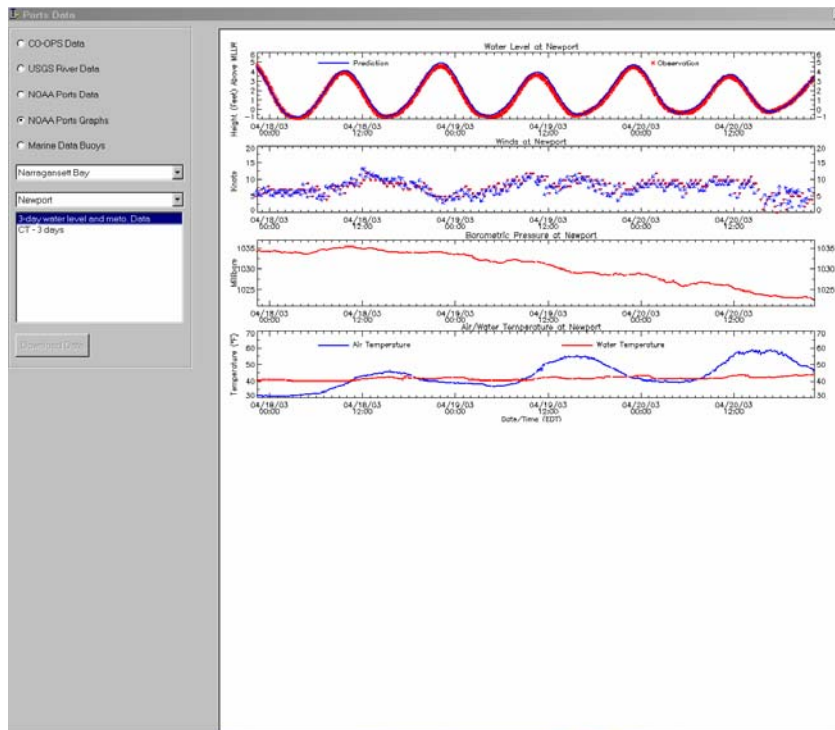
2.2.2 Satellite Images

COASTMAP's Satellite Images form provides an extensive list and window for visualizing a variety of past, present, and forecast meteorological and oceanographic conditions. The menus allow the user to choose the geographic area of interest and which type of image – such as visible, infrared, or local radar image – while the lower box shows the times available for the selected type of image. When a number of images from different times are available, the **Animate** button will be enabled. This downloads all the images to a temporary local file, so the user can then use the arrow keys to scroll through the images and animate them as desired.



2.2.3 Web Based Data Linkages

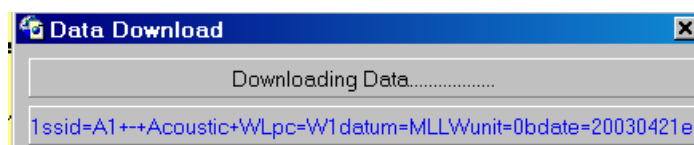
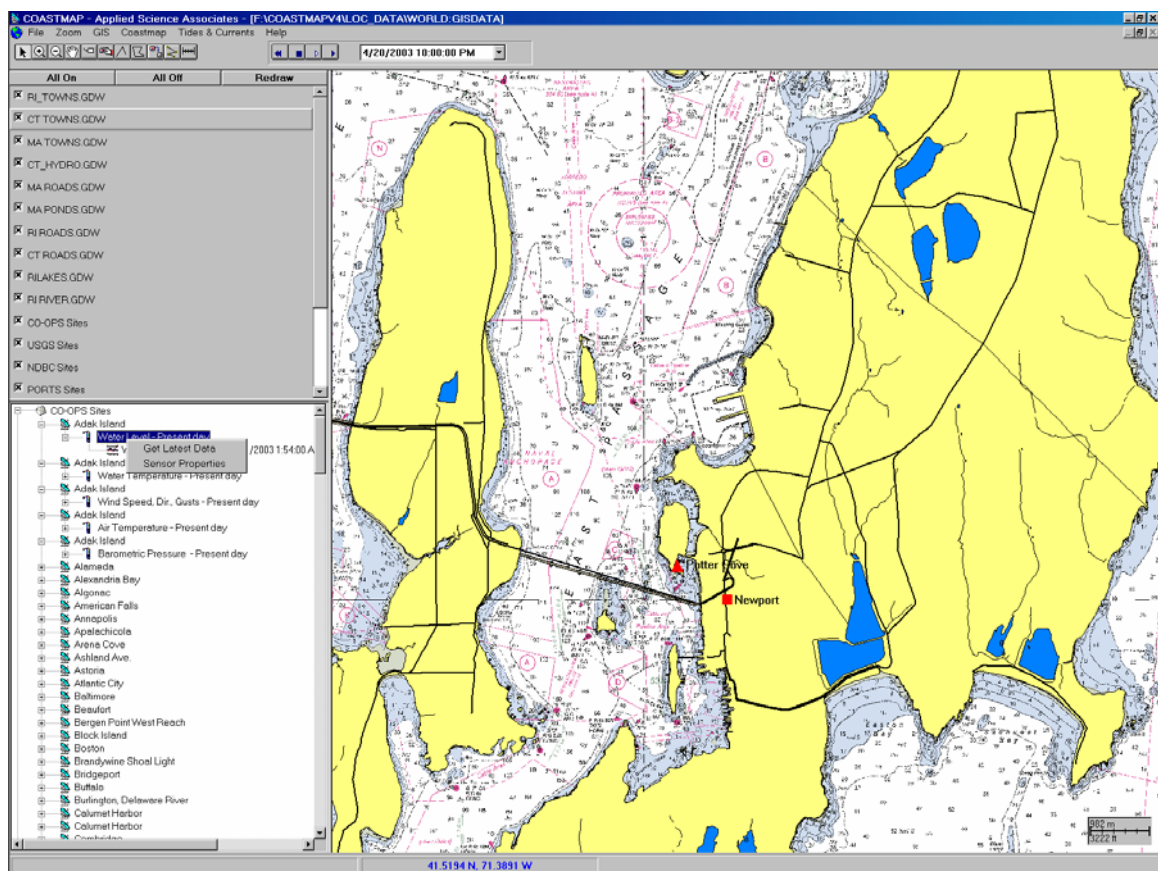
Coastmap provides access to web based data resources such as NOAA CO-OPS and USGS for download and visualization. From the Coastmap pull-down menu select Web Data Links and the form shown below becomes available. From this form the user can choose from four available data sources for download into the current location.



- Select CO-OPS from the left side of the form.

- Select update layer. A CO-OPS Coastmap layer will automatically be created if one does not already exist and the Coastmap database will be scanned for available data sites and added as data stations to the new or existing layer.
- When a data set is being viewed in this form, the **Download Data** button is enabled. When this button is clicked, Coastmap automatically downloads the file and puts the data into a local file that can be accessed later for data manipulation or visualization.

- In addition to downloading data from the Web Data form, the same data can be downloaded and stored locally from the main form in the following way:
 - From the Coastmap Layer and Data list expand a station by clicking on the plus sign. This will expand the station to reveal all instruments attached.
 - Choose an instrument and right click on it. A pop-up form will appear which contains Get Latest Data and Sensor Properties.
 - From the pop-up form choose Get Latest Data.
 - A form will appear telling the user that the latest available data set for the sensor is being downloaded.
- Whichever method is used to download data from the web, the data will be stored in the same format and location, and will be appended to any existing data set for that location.



2.3 Link to Coastmap's own data source

In addition to downloading and processing data available through the web, Coastmap also can link to its own server containing a variety of real-time and archived information. Select **Coastmap Data** from the **Coastmap** menu. A form displays that gives several options for what type of data the user can look for.

The screenshot shows a window titled "Current Files" with a standard Windows-style title bar (minimize, maximize, close buttons). At the top left are "OK" and "Cancel" buttons. The main area is divided into three sections:

- Local Hydrodynamic Files:** A list box containing the following files:
 - 2003013012.BPV
 - 2003021112.BPV
 - 2003021212.BPV
 - 2003021412.BPV
 - 2003041507.BPV
 - 2003041607.BPV
 - 2003041807.BPV
 - 2003042107.BPV
- File type to search for:** A group box containing five radio button options:
 - ☐ Hydrodynamic Model (BPC)
 - ☒ Wave Model (BPV)
 - ☐ Wind Model (NBLaps)
 - ☐ Extratropical Storm Surge Model
 - ☐ PORTS Data Archive
- Files available on server:** A section with a "List Available Files" button and a list box containing the following ZIP files:
 - 2003041507.zip
 - 2003041607.zip
 - 2003041707.zip
 - 2003041807.zip
 - 2003042107.zip
 - 2003042407.zip
 - 2003042507.zip
 - 2003042807.zip

Below the "File type to search for" group box is a left-pointing arrow button.

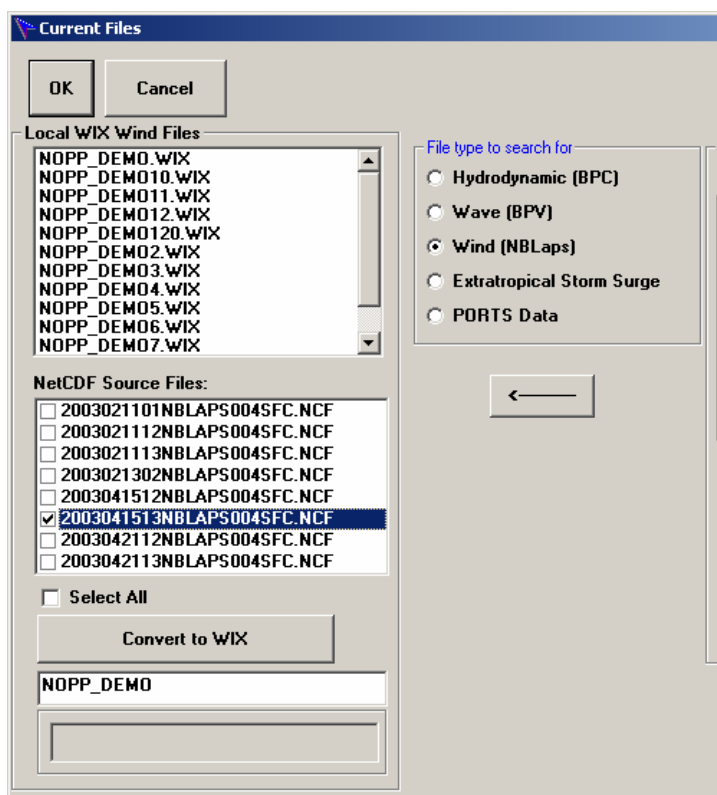
2.3.1 Model Data

In the center of the form are several options corresponding to the data types available on Coastmap's data storage site. On the right side of the form, the user can click **List Available Files** to query the server and display the remote files available. On the left side of the form are the files of this type available locally.

For the **Hydrodynamic** and **Wave** options, the necessary data files on the remote server are stored in one ZIP archive. By selecting the remote file

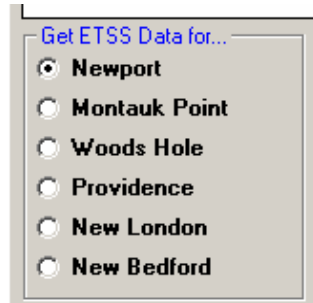
desired – based on its date as indicated by the file name – and clicking the download arrow, the user automatically unzips and stores the bundled files. Then, to view any local file, select that file in the box on the left and click **OK**.

If **Wind** is the data type selected, a form appears showing the local files wind available in NOAA's NetCDF format, and gives the user the option to convert the data into a WIX file usable in Coastmap.



Check the NCF files whose data should be used in making the WIX file. Type in a name for the WIX file in the box at the bottom, and select **Convert to WIX**. Coastmap converts the raw data into the proper WIX format and stores it in the location's winds directory, as reflected in the listing of wind files. To load a WIX file into an active Coastmap layer, select it and click OK.

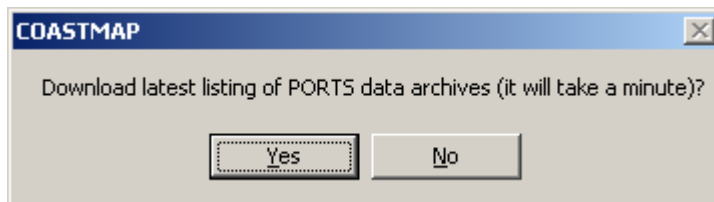
The **Extratropical Storm Surge (ETSS)** model data is downloaded in a manner similar to the wind and wave forecasts, with one added option. The location box allows the user to choose which of several sites is of interest and after clicking List Available Files, the remotely stored data for only that location will be displayed. After downloading the data, select the file of interest and Coastmap will display it in another station layer in the tree, called Temp Files.



2.3.2 PORTS Data

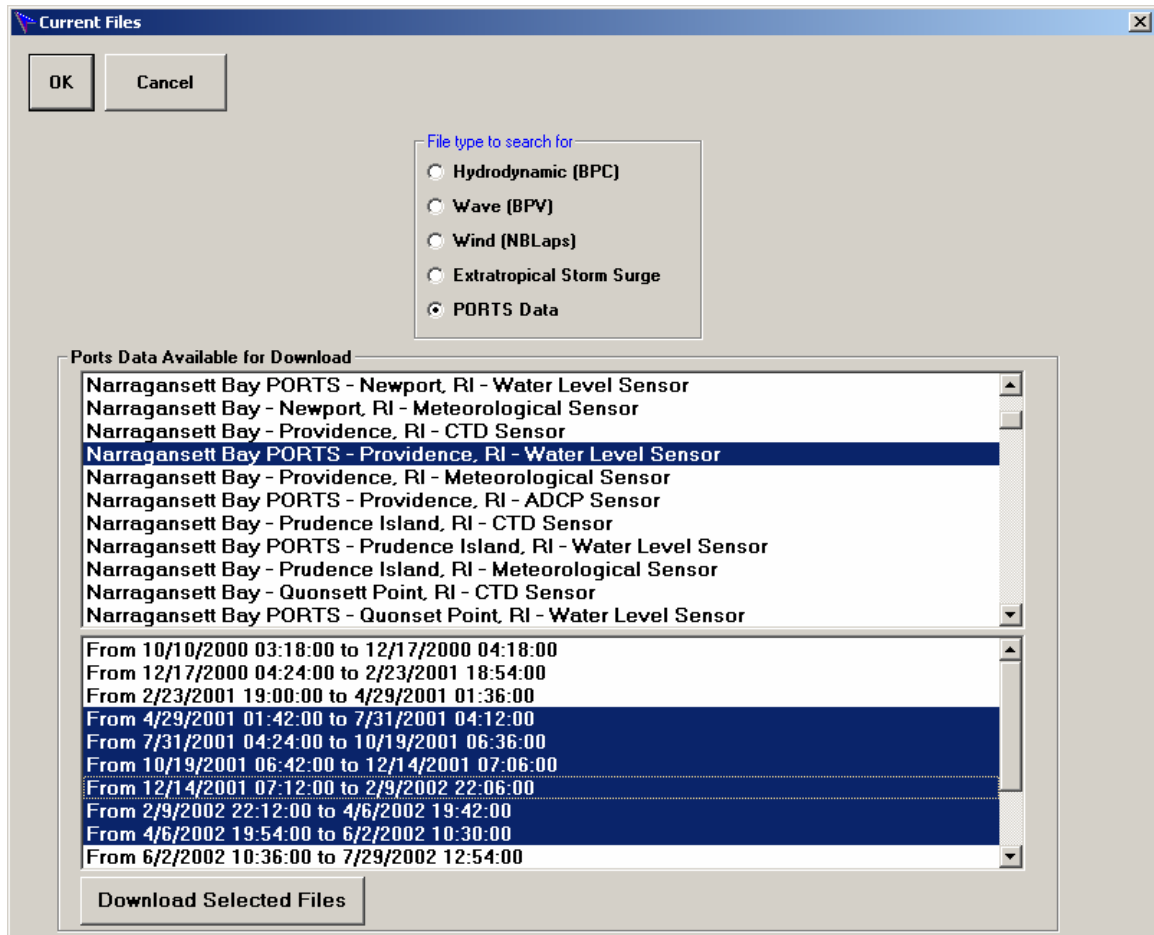
As well as current, wind, wave, and extratropical storm surge model data, Coastmap can access archived data sets from NOAA PORTS sensors. When the user selects this option, the form takes on a different layout and presents options for site and time range of data to download.

The first option is the choice to check the most recent file listing.



If you want to view recent data from PORTS sources, you should choose to download the listing, which could take several minutes depending on the Internet connection. Otherwise, Coastmap will list only the data files available the last time these listings were downloaded.

Coastmap then displays two windows, one listing the data sites available, and the lower one showing the time periods available for the selected site.



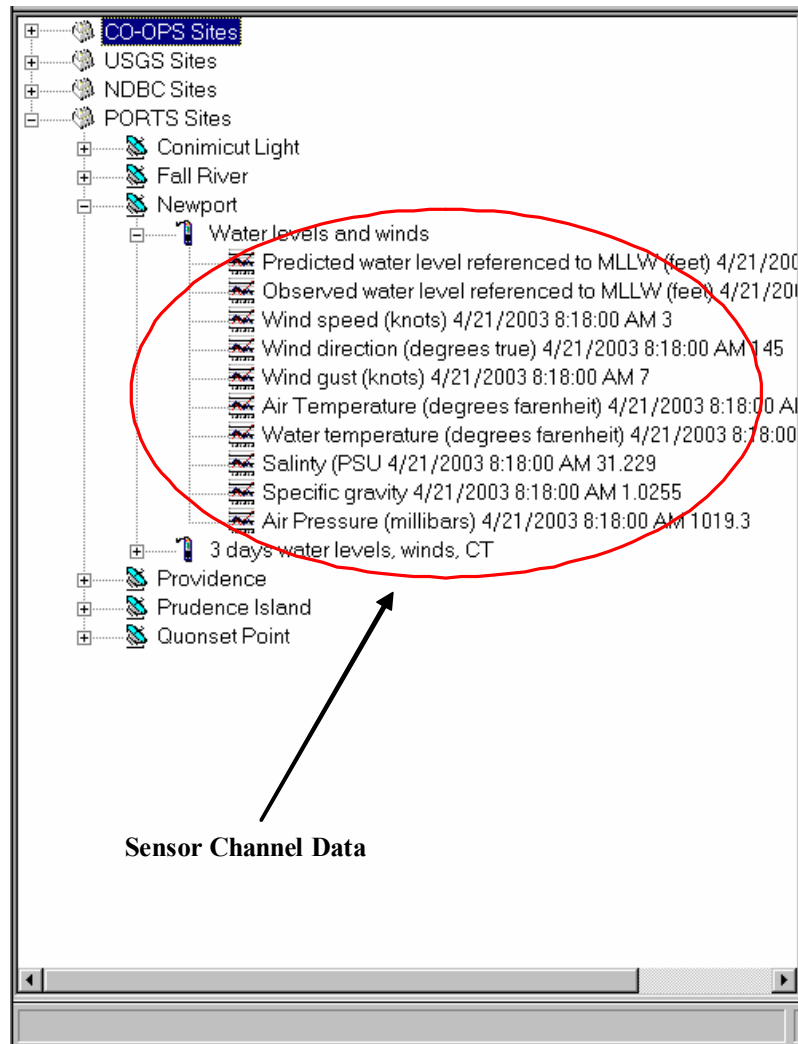
When you have selected the site and data time sets you want to download, click **Download Selected Files**. Coastmap downloads each data file and converts the data to its native CTF format. If you click **OK** after the data are downloaded, the file will be loaded into Coastmap.

Archived files from this source average 300 kb in size each; download time will vary corresponding to Internet connection being used.

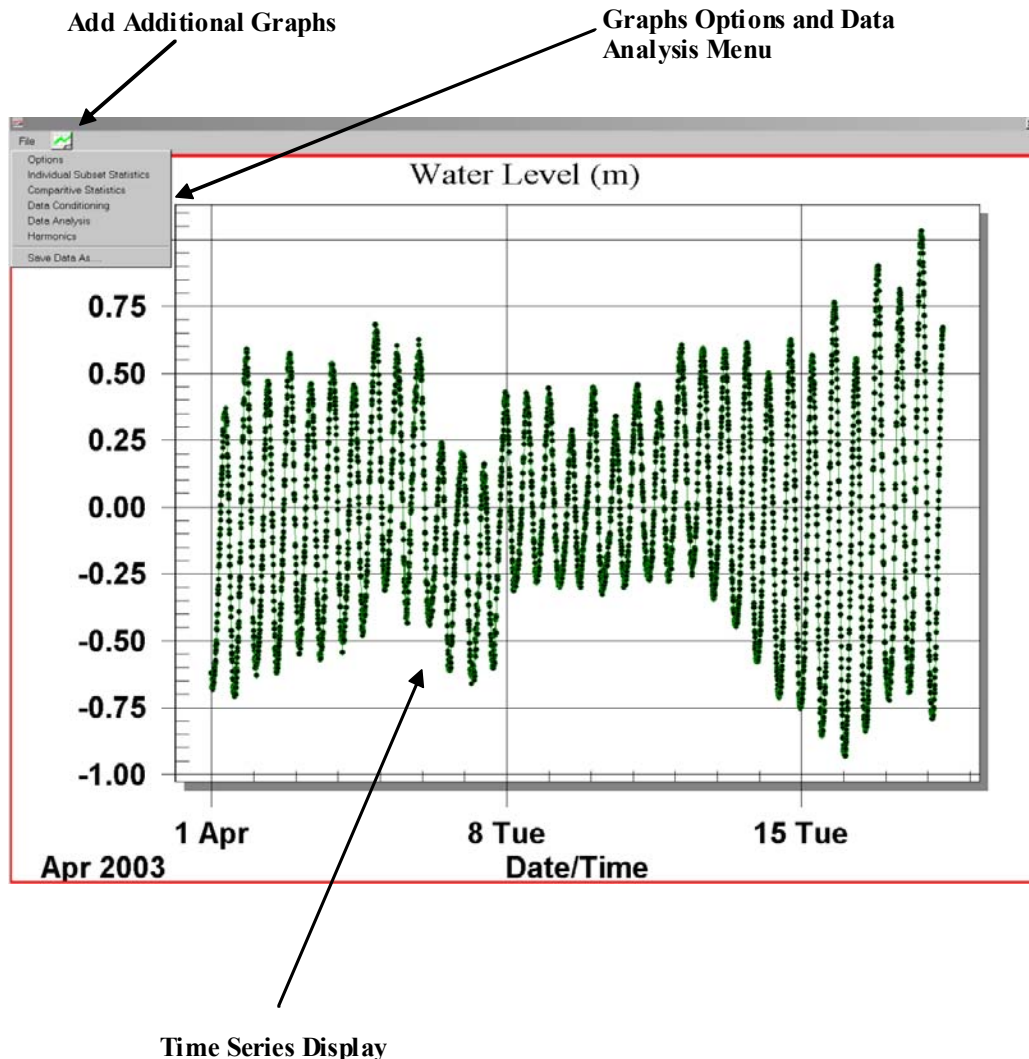
2.4 Data Analysis and Conditioning

The time series data are available through the Coastmap Layer and Data List. The data is accessed by selecting a sensor channel data, as shown in figure below.

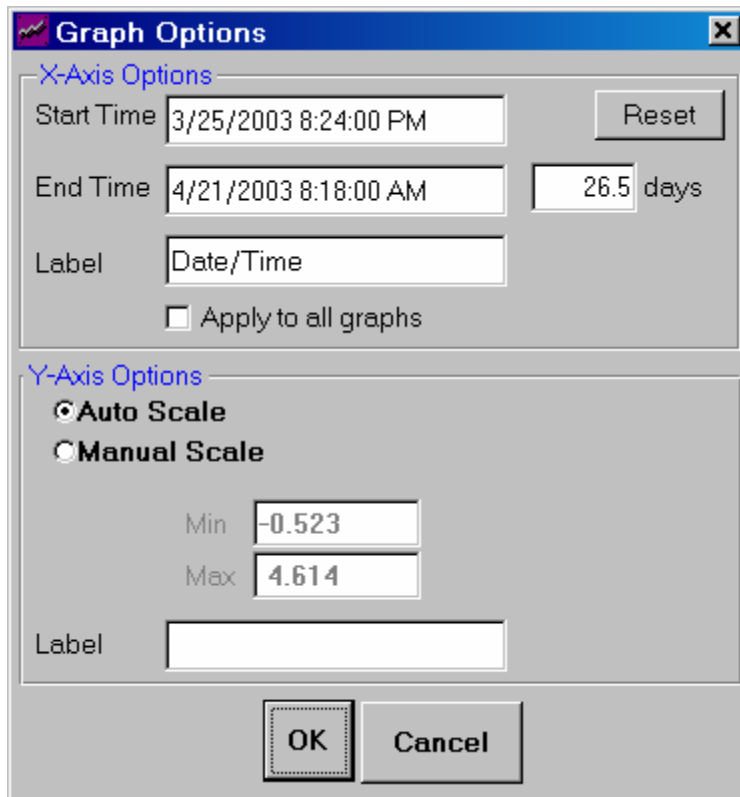
Double-click on a time series title to view a graph of the data series.



Upon selection of a data set the analysis and visualization form appears. This form allows the user to conduct conditioning operations such as demeaning, spurious data removal and filtering; the calculation of single and comparative time series statistics; data analysis such as power spectrum and auto and cross correlation; and the development of harmonic forecasts in standard tide table format.



By choosing **Options** from the **File** pull-down menu the user can set the start and end time of the data display, add customized labels to the graph, and set the y-axis limits.



Graph Options

X-Axis Options

Start Time: 3/25/2003 8:24:00 PM [Reset]

End Time: 4/21/2003 8:18:00 AM 26.5 days

Label: Date/Time

☐ Apply to all graphs

Y-Axis Options

☒ Auto Scale

☐ Manual Scale

Min: -0.523

Max: 4.614

Label:

OK Cancel

2.4.1 Statistics

By choosing **Individual Subset Statistics** from the **File** pull-down menu the user can view the essential characteristics of the data set, including size, extreme values, standard deviation and variance.



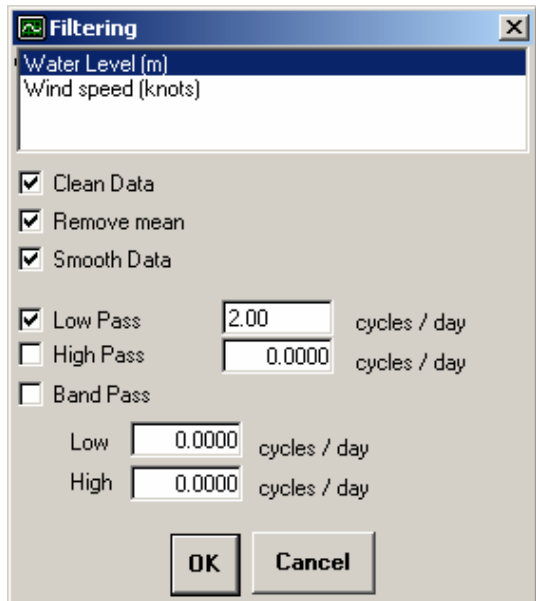
Statistics: 1 Time Series

No Points:	13099
Mean:	0.721
Minimum:	-2.045
Maximum:	4.508
Std Dev:	0.555
Variance:	0.308

Water Level [m]

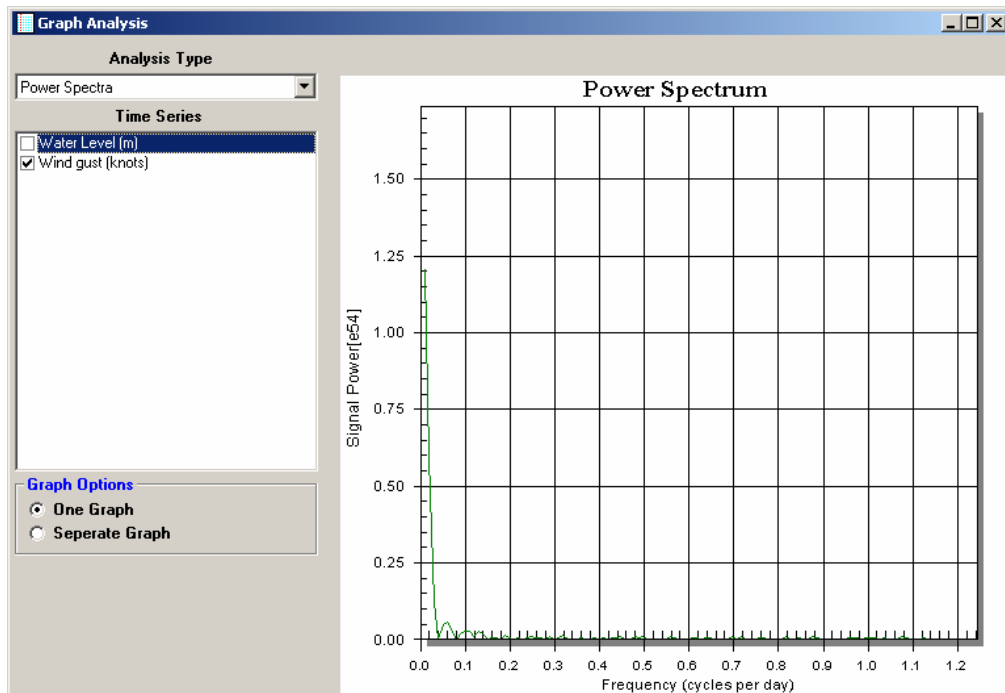
2.4.2 Data Conditioning

The **Data Conditioning** option allows the user to clean, smooth, and adjust the selected data set. The user can choose to clean the data, re-center it (remove the mean) or smooth it with any of several adjustable filters. Once the options are selected and necessary values input, clicking **OK** will have Coastmap carry out the data filtering.



2.4.3 Data Analysis

With the **Data Analysis** menu option, Coastmap can compute and graph power spectra and correlation statistics for one or multiple data sets.



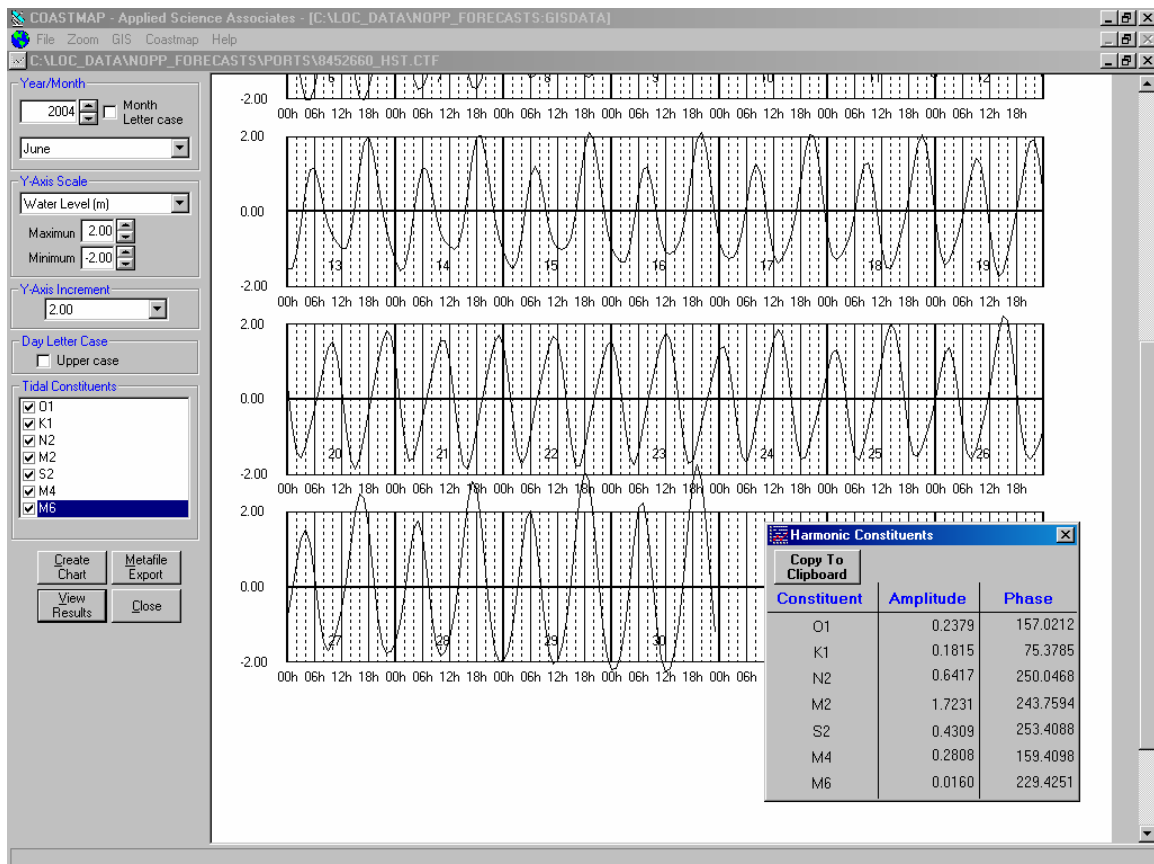
In the uppermost list box the user can choose the type of analysis, whether power spectra, auto-correlation, or cross-correlation (between two data sets). Below that is the box to check off which data sets should be analyzed. With the buttons on the bottom the user can either overlay the results for several data sets, or make a separate plot for each set. Coastmap plots the results automatically to the right of the menus as these options are selected.

2.4.4 Harmonics

The **Harmonics** menu option enables the user to perform component analysis on water level data sets. Coastmap analyzes water level data and determines the relative strengths of any or all of seven tidal constituents. The calculations are based on the water levels over extended periods, so longer data sets lead to more accurate analysis, and gaps in the data compromise the accuracy.

Once the tidal signal amplitudes and phases are calculated, Coastmap can produce a month-long tidal forecast to the user's specifications. The controls on the left of the window enable the user to specify the month and year desired, as well as the vertical axis scale and display properties.

With individual check boxes for each tidal constituent, the user can specify which series to display in the chart.



Once the options are set, the user can produce a graphical chart of the forecast with the **Create Chart** option, and view the amplitude and phase values for each tidal constituent with the **View Results** option. The chart can be exported as a Windows metafile and the text results can be copied to the clipboard.

2.4.5 Exporting a data set

When changes are made to the data in a graph window, the original data file from which the graph came remains unchanged. To save the data set after it has been cleaned, filtered, or otherwise changed, take the following steps:

1. Choose the data set to export and graph the data
2. Right-Click on the dialog and select **Export Dialog...**
3. Fill out all the appropriate fields in the Export dialog.
4. Click **Export**.

Exporting San Francisco Sensor - CO-OPS Currents [X]

Export

☒ MetaFile ☐ BMP ☐ Text / Data Only

Export Destination

☒ Clipboard

☐ File []

☐ Printer

Object Size

☒ No Specific Size ☐ Millimeters ☐ Inches ☐ Points

Width: [1000] / [810] Units

2.5 Particle Model

Coastmap has a built-in particle model for simulating spills or other discharges or search-and-rescue scenarios. Start the model by choosing **Run**

Particle Model under the **Coastmap** menu. The pointer changes shape so that you can click on the particle discharge site.



After you select the discharge site, the window appears presenting options for the simulation. Any BPC file corresponding to the time period selected can be chosen as the source of water current data for the simulation, or NOAA current station output can be used. Other aspects of the spill can be specified here as well.

The screenshot shows a dialog box titled "Default" with a close button (X) in the top right corner. On the left is a small image of a boat. The main area is divided into two sections: "Model Information" and "Currents".

Model Information

- Latitude: 41.36092 N (radio button selected for DD.DD format)
- Longitude: 71.30448 W (radio button selected for DD MM.SS format)
- Spill Start Time: 4/21/2003 2:00:00 PM
- Simulation Length: 24.0 Hours (with a note: "i.e make a prediction for how many hours in the future")
- Release Duration: 0.0 Hours (with a note: "i.e how long is the release for")

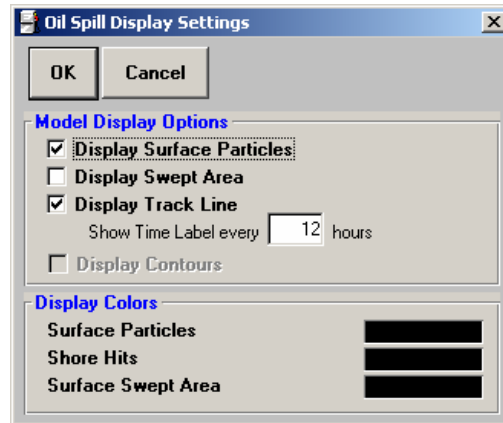
Currents

- ☐ Use Coastmap Currents: A dropdown menu shows "2003042100.BPC" and a date range "4/20/2003 7:00:00 PM - 4/22/2003 5:00:00 PM".
- ☒ Use NOAA Current Stations

At the bottom are "Cancel" and "Run Model" buttons.

After selecting **Run Model**, the trajectories of the particles are calculated based on the currents selected. The results can be viewed with the time track toolbar at the top of the screen.

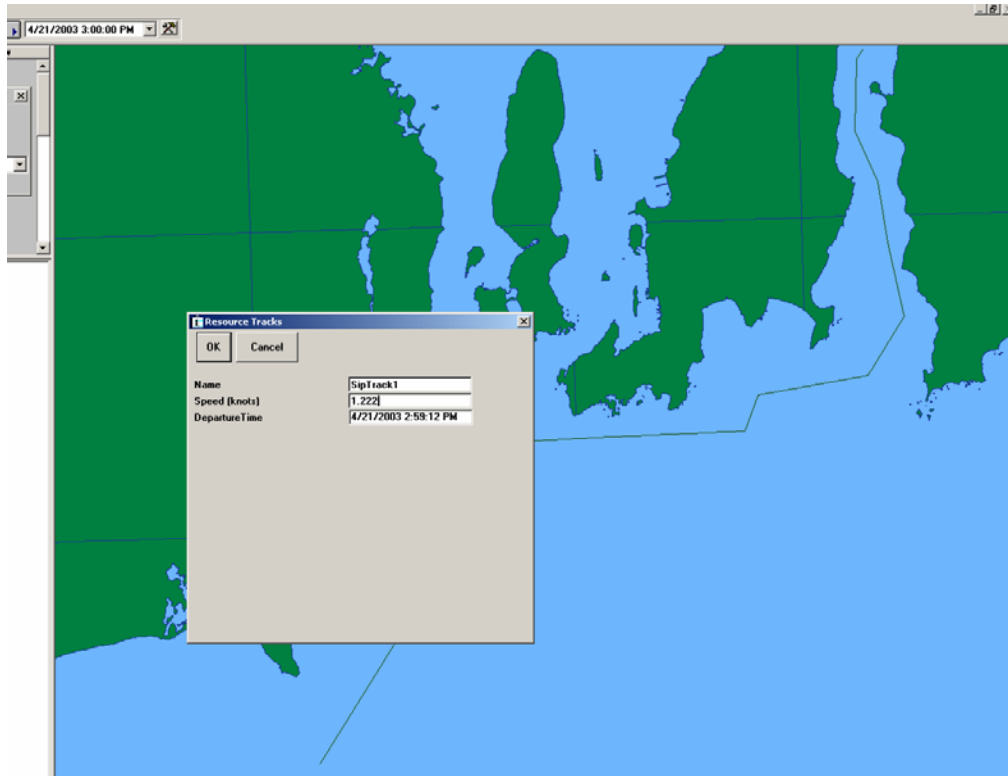
To adjust the particle model results display, right-click on the basemap and select Model Display Settings to bring up the window with options.



2.6 Conditions Along Vessel Track

The user can input the path, speed, and time of a vessel's voyage and have Coastmap track conditions throughout the trip. Coastmap displays the conditions synchronized with the ship's track, as well as the results of the particle model output, if desired.

Choose **Add Vessel Track** under the **Coastmap** menu and click on the beginning and each subsequent point of the vessel's path, double-clicking on the final location. A window appears allowing you to name the track and provide the speed and start time of the voyage.



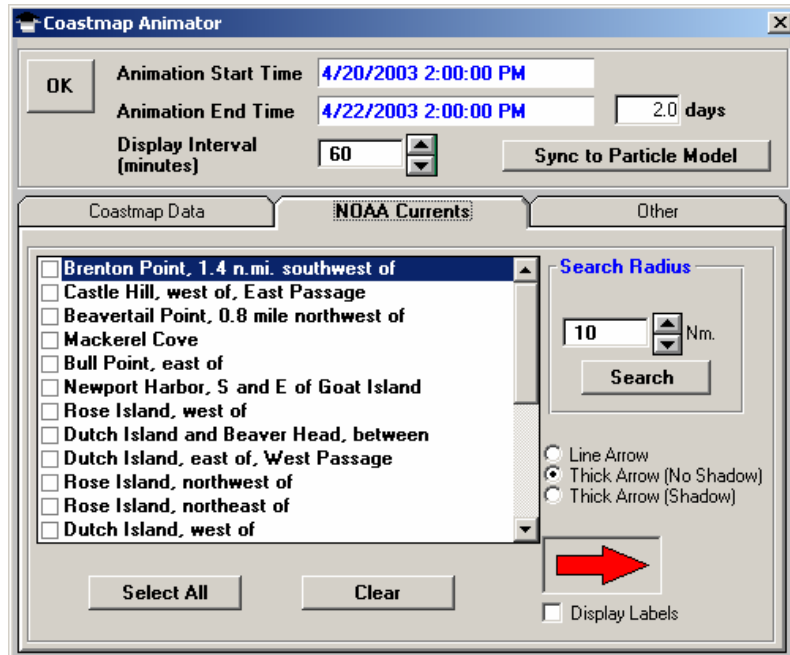
Once the necessary information is entered and you click **OK**, you can view conditions at any point in the voyage. Play through the time of the entire voyage or proceed step by step using the track time control toolbar at the top

of the screen.



The toolbar is located at the top of the screen. It contains several buttons: a left arrow, a square, a right arrow, and a play button. To the right of these buttons is a text box displaying '4/21/2003 3:00:00 PM'. To the right of the text box is a dropdown menu and a button with a magnifying glass icon.

The conditions at the time displayed in this window will be displayed. To adjust which conditions are displayed, click on the rightmost button of this toolbar. You can choose which NOAA currents to display as vectors on the basemap, and what Coastmap data to display. To do this, after clicking on the leftmost tab ("Coastmap Data"), simply drag and drop a channel label from the data tree on the lower left portion of the main form into the Coastmap Animator window.

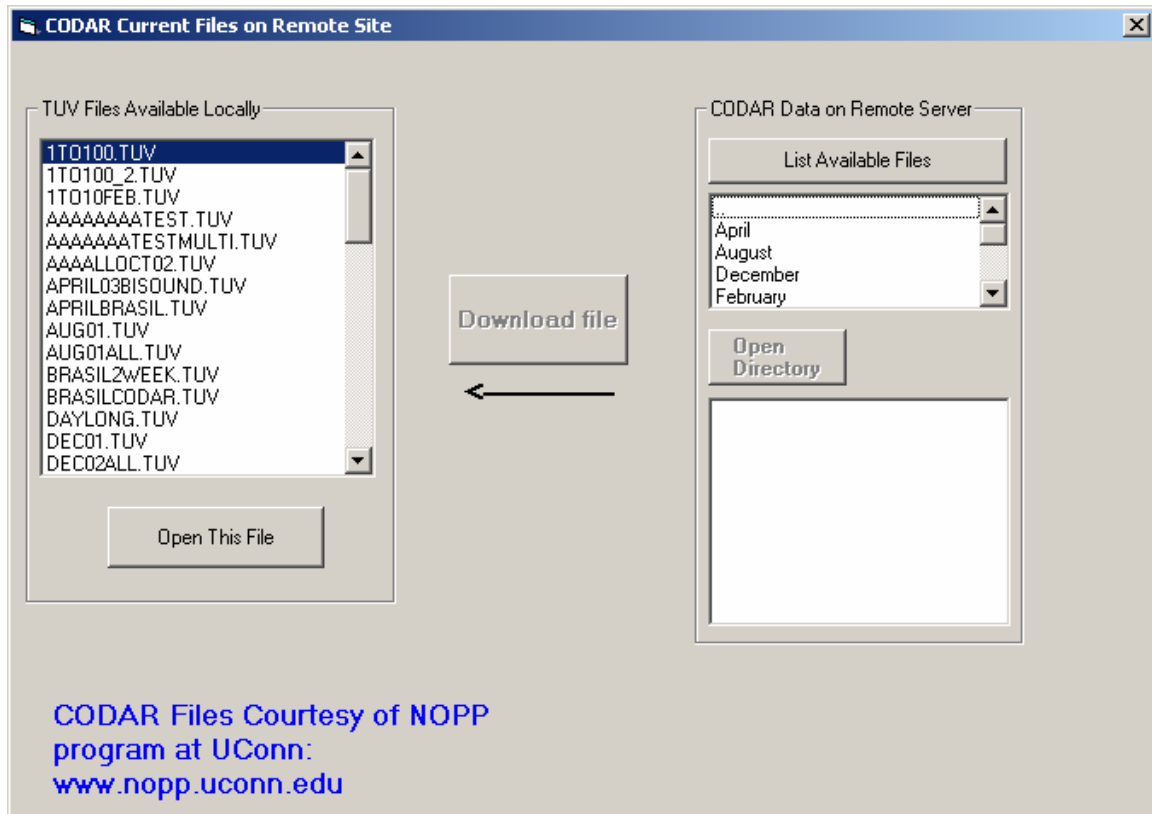


You can view the data over any time step value you choose, or you can set the time step equal to the time step of the particle model. When you have chosen what conditions to view, click **OK** to effect the display changes.

2.7 CODAR currents

Coastmap also offers a link to CODAR current data, which provide hourly observed water currents for Block Island Sound.

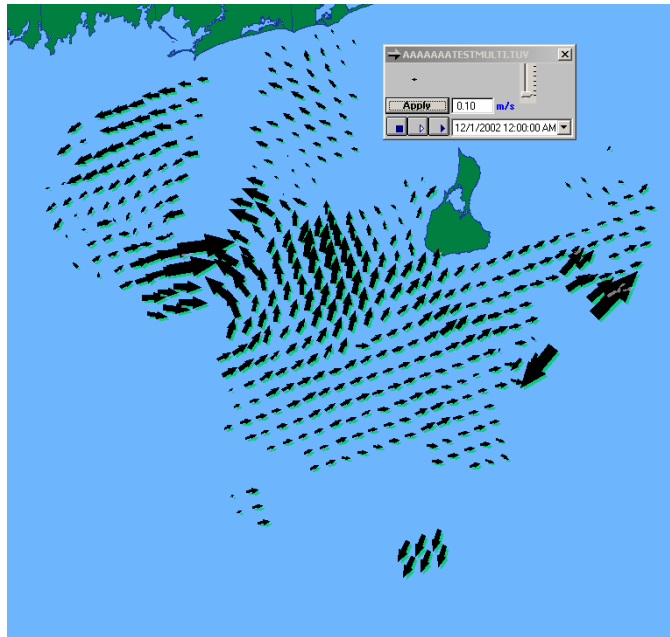
The hourly observed currents are stored on a server that Coastmap links to, and can be downloaded locally and converted into a Coastmap-friendly format. To access these options, choose **Coastmap>CODAR and TUV files**.



The box on the left shows the CODAR derived currents available locally. On the right is an embedded FTP client, which the user can use to find and download more CODAR readings. After **List Available Files** is clicked, Coastmap shows the current directory on the server, which holds CODAR data by year and month it was collected. Double click on a year or month to open directory, or on the “..” at the top to move back up a level. Any CODAR currents that are available in the current directory are listed in the box on the lower right.

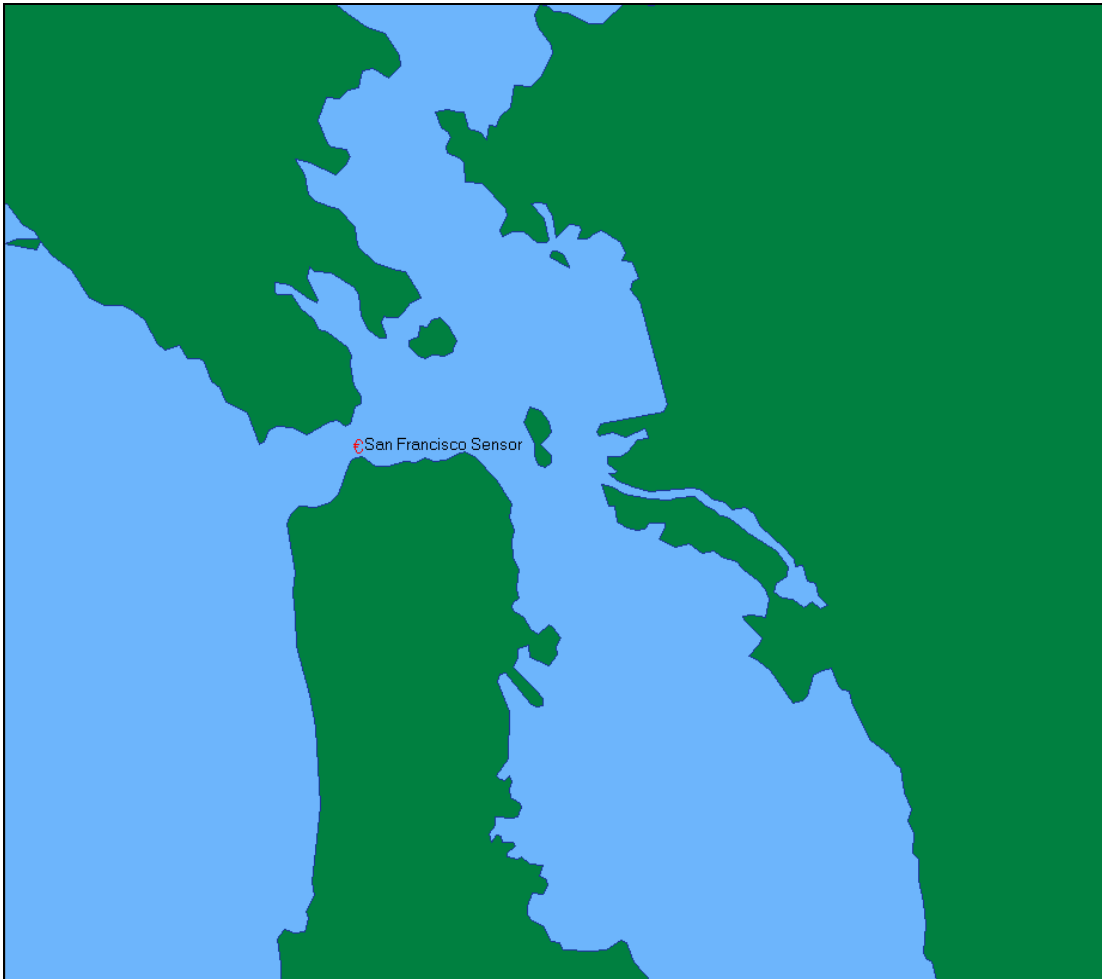
To make a file containing the CODAR observations, select the CODAR observations you wish to include (the naming scheme refers to the day and hour of the observation), and click **Download File**. Coastmap prompts you to choose a TUV file to append to, or create a new one.

The list on the left displays all TUV files available in the current location’s \CURRENTS folder, including any new ones created. By highlighting one of these folders and choosing Open This File, Coastmap loads the file into a layer and opens a display box. The solid triangle allows you to animate all hourly currents in the file, while the outlined triangle button allows you to step through them one by one.



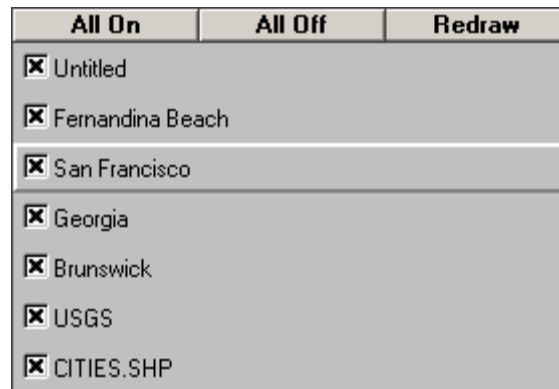
3. Details: The Coastmap User Interface

3.1 The Map Area



The Coastmap map area provides a simple and intuitive interface to much of the application's functionality. The map displays the land and water features for the active geographic location. Using the GIS tools in the GIS toolbar (see section 2.2), a user can create and modify objects on the map. The map can be panned, zoomed in and out, and modified by adding or removing layers (see section 2.3). Map colors can be controlled by right-clicking in the map area and selecting the *Map Display Settings* option, or by choosing *Display Settings* from the File menu, or by pressing *CTRL-D*.

3.2 The Layer List



The layer list, located to the left of the map area, provides easy access to all of the GIS layers loaded into the location. (See section 3.3.1, *GIS Objects and Layers*, for more information.) Layers can be on or off (indicated by the checkbox to the left of the layer's name) and active or passive. Only one layer may be active at a time, and the currently-active layer is raised in the layer list. All GIS actions, such as adding, modifying, or deleting GIS objects, are performed on the active layer.

To modify which layers are currently displayed on the map, check or uncheck each layer's on/off box and then click the **Redraw** button at the top of the layer list. To automatically set all layers on or off, click either the **All On** or **All Off** buttons at the top of the list.

3.3 The Station Tree and Data Channels

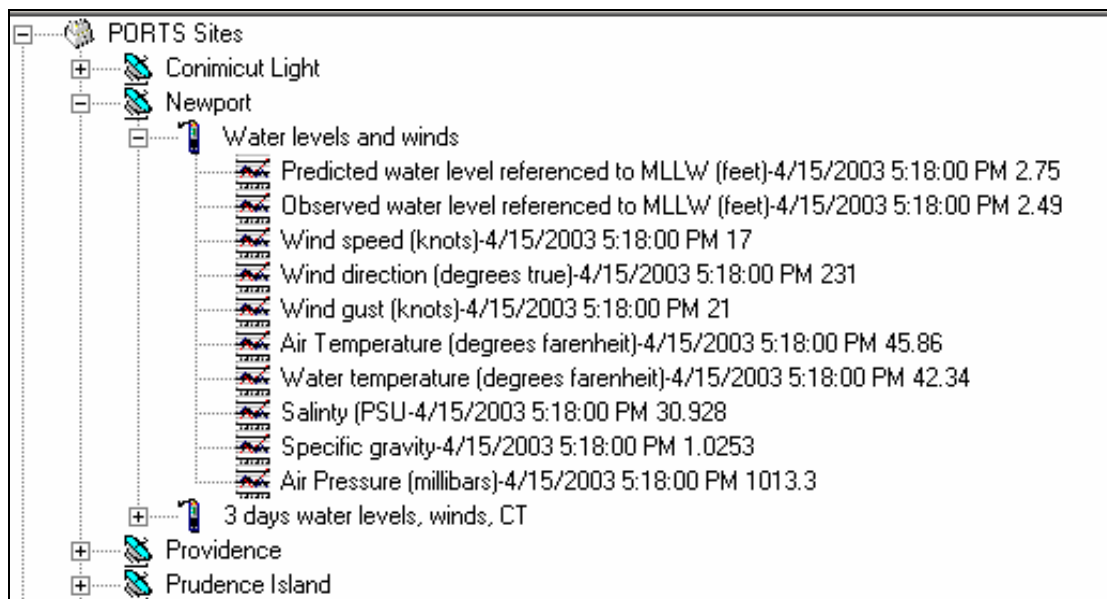


Data in Coastmap is stored in Channels, with one channel for each data time series. The data files are organized first according to the station layer (or type) they come from, then by which station, then which sensor at that station. To expand any level on the data tree, click the plus sign to the left of the name and to collapse it, click on the minus sign.

To view data, expand the appropriate station layer in the data tree, which is located below the layer list and to the left of the map area. Then expand the corresponding layer and, under that, the sensor name.

To view the data from any channel, double-click on the channel name and it will be graphed. To download the latest data from the sensor, right-click on the sensor and choose Get Latest Data.

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3.4 Base Map Options

Every Coastmap location contains one or more base maps. Base maps can be either a vector map drawn from a set of longitude/latitude coordinates, or a raster image which has been registered to longitude/latitude coordinates.

Vector base maps consist of polygons depicting land features within an area. When drawn in the map window, the land polygons are drawn in one color (e.g. green) on a background of a different color (e.g. blue). See section 2.1, *The Map area*, for information on how to change these display colors.

3.4.1 Creating New Base Maps

Base Maps can be created from MapInfo (mif/mid) files or ESRI ArcView (shp) files. The base map files can be stored on a local hard disk or network disk drive, or on CD-ROM.

To create a new vector base map file, generate land polylines or polygons using geographic coordinates in one of the base map formats. Raster base maps are bitmaps created by scanning a paper map into digital form. A raster base map captures all the features on the paper map and creates a fixed image of the map. Two raster base map formats (BSB Electronic Charts and Resolution Mapping/Maptech) are commercially available on diskette for single charts or on CD-ROM for all charts within an entire region. These charts are available at most nautical supply stores.

3.4.2 Importing an Existing Base Map

Change the base map displayed in the current geographic location by choosing *Base Map* from the File menu. In the Map Files dialog that appears, select a file type, the drive and directory where the file is located, and then highlight the file to be used. Click **OK**. The selected base map will be active in the current geographic location until a different file is selected.

3.5 Locations

Every Coastmap scenario is specific to a particular geographic location. All data and model output are stored within this location. The location consists of an area defined by its outermost longitude/latitude coordinates, one or more base maps depicting the land and water within this location, and all the layers containing data for this location.

3.5.1 Loading an Existing Location

To load a location in Coastmap, select **Geographic Location** from the **File** menu. Browse to the directory where the new location is stored, and select its name from the list presented. All data for this location will be automatically loaded into Coastmap.

4. Details: Geographic Information System

Coastmap contains an embedded Geographic Information System, or GIS. The GIS is a system for storing, retrieving, and displaying geographically referenced data.

4.1 GIS Objects and Layers

Any type of data with a specific geographic location and be stored as a GIS object. A GIS object can be one of four distinct types:

- A point is an object with a single location.
- A line is an object with two locations defining its endpoints.
- A polyline is a series of lines with shared endpoints.
- A polygon is a closed polyline which may be filled with color or pattern.

Each object in the GIS database, as well as having a geographic position, may also have textual, numeric, and or graphical information attached to it. This is called attribute data and is stored in Microsoft Access database tables.

GIS objects are grouped in layers, and any number of layers are then grouped into a GIS database. The layers available for the current GIS database are listed in the GIS Layers list (see section 2.3, *The Layer List* for more information). Layers typically contain objects with similar characteristics, such as a layer of place names, or a layer of shellfish beds. A layer can contain all four types of objects. Any number of layers can be contained in a single GIS database. Additional GIS databases may be created to organize data, but only layers from a single geographic database may be displayed on the map at one time.

4.2 Adding, Renaming, and Deleting GIS Layers

Layers can be added and deleted from the active GIS database. The names of existing layers can also be changed. These capabilities are accessed through the *Layer Tools* option of the GIS menu, which brings up the **Layer Tools** dialog.

To add a new layer to the database:

1. Click on the **New Layer** button at the bottom right of the **Layer Tools** window or select **Create New Layer** from the GIS menu. This will bring up a window in which to enter the name of the new layer. The default name is "Layer n " where n is the layer number.
2. Click on **Add Field** to define the data type and name of the first field and continue to add as many fields as required. Alternatively, select **Defaults** to use the Coastmap default data fields. The default structure of this table is shown below:

Field Name	Field Type
Name	Text [20]
Description	Text [20]
Text 1	Text [40]
Text 2	Text [40]
Text 3	Text [40]
Text 4	Text [40]
Text 5	Text [40]
Text 6	Text [40]
LinkFile	Text [255]

3. Select **OK** to add the new layer to the end of the list of layers. The new layer will have the name you entered and will already be selected (highlighted).
4. The position of the layer in the layer list can be changed by using the up and down arrow buttons on the right side of the **Layer Tools** dialog.

To change the name of a layer:

1. Select the layer to be renamed from the list of layers on the right side of the **Layer Tools** dialog. It will be highlighted and its name will appear in the box at the top of the window.
2. Enter the new name for the layer in the box at the top of the window.
3. Press *Enter* or click on the **OK** button at the bottom of the window to save the new layer name.

To remove a layer from the database:

1. Select the layer to be deleted from the list of layers on the right side of the **Layer Tools** dialog.
2. Click on the **Remove Layer** button at the bottom right of the window.

To import a layer from another database:

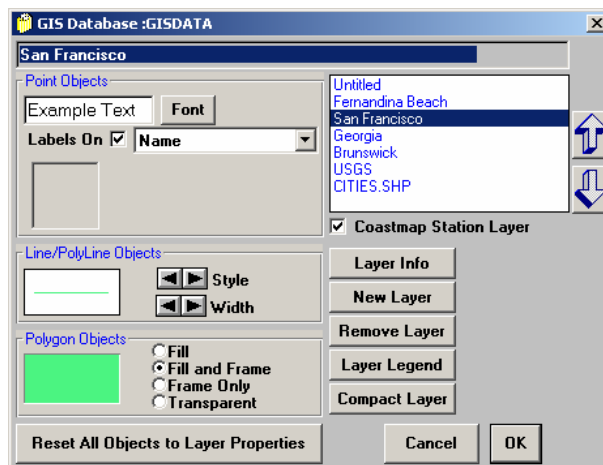
1. If the file name of the layer to be attached is not known, verify it by selecting that layer in the **Layer Tools** dialog and selecting **Layer Info**. The file name will be given under **Geo File**.

2. Open the new database to which the layer will be added by selecting **GIS Database** in the GIS menu.
3. Select **Layer Tools** in the GIS menu, and select **Attach Layer**. Select **ASA GIS Layer** on this window and find the appropriate file from the other database. When the selection is made, select **OK** and the new layer will appear on the Layer list.

4.3 Editing GIS Layers

To set the display characteristics of objects by layer, select **Layer Tools** from the GIS menu, or double-click on the name of the layer that you wish to edit in the Layer list. This brings up a form on which you can specify:

- The layer whose characteristics are to be set.
- The icon style and size used to represent point objects. Click on the icon box to bring up the font/size menu.
- The line color, style, and width used to represent line and polyline objects. Click on the line box to bring up the color menu.
- The color, pattern, and style used to represent polygon objects. Click on the polygon box to bring up the color/pattern menu.
- Whether or not labels are to be displayed with point objects, the layer attribute to use as a label, and the font characteristics of the labels.






This form is also used to add, rename, and delete layers in the active GIS database (see section 3.3.2, *Adding, Renaming, and Deleting GIS Layers*).

4.4 Adding and Deleting GIS Objects


Objects are added to GIS layers using the mouse to set the position of the objects. All objects are added to the active layer.

To add objects to the active GIS layer:

1. In the Layer list, set the active layer by clicking to the right of the on/off checkbox of the desired layer.
2. Check that the active layer is checked on. Otherwise, the objects entered will not be visible until the layer is turned on.
3. Select *Add Object* from the GIS menu, then select the appropriate object type from the *Add Object* drop-down menu, **OR** click on the appropriate button on the GIS toolbar (see section 2.2, *The GIS Toolbar*)
4. To add:
 -  **Points:** Click the mouse cross-hair at the location for the point. The longitude/latitude position of the cross-hair is displayed at the bottom right of the screen.
 - **Lines:** Click the mouse cross-hair at the location for the first point in the line, then move the cross-hair to position the end point of the line and click to place the end point. The longitude/latitude position of the cross-hair is displayed at the bottom right of the screen.
 -  **Polylines:** Click the mouse cross-hair at the location for the first point. The longitude/latitude position of the cross-hair is displayed at the bottom right of the screen. Then move the cross-hair to position the next point in the polyline and click. Repeat this for all vertices in the polyline. Double-click the left mouse button to end the polyline. The point set by this final click is not part of the polyline.
 -  **Polygons:** Click the mouse cross-hair at the location for the first point. The longitude/latitude position of the cross-hair is displayed at the bottom right of the screen. Then move the cross-hair to position the next point in the polygon and click. Repeat this for all vertices in the polygon. Double-click the left mouse button to end the polygon. The point set by this final click is not part of the polygon.

- **Circles:** Circles are special cases of polygons. Click the mouse cross-hair at the center of the circle and while holding down the mouse button, drag the circle to the size desired and release.
 - **Rectangles:** Rectangles are special cases of polygons. Click the mouse cross-hair to position the corner of the rectangle and while holding down the mouse button, drag the rectangle to the size desired and release.
5. An attribute form will appear with the layer name in the header.
 - Enter any desired information on the attribute form.
 - If a link file field is available, attach text or graphic files to the object by clicking on the **Link** button at the bottom of the attribute form.
 6. Click **OK** to add the object to the GIS database active layer.


To delete objects from any GIS layer:

1. Use the Layer list window to turn on the display of the layer that contains the object to be deleted by clicking the on/off checkbox next to the layer's name. The layer does not have to be the active layer.
2. In Interrogate mode (select the Interrogate GIS Object tool  from the GIS toolbar), click on the object to be deleted. This brings up the **Object Attributes** window (see section 3.3.6, *Editing GIS Objects*).
3. Click on the **Del** button at the top of the **Object Attributes** window to delete the object. You will be asked to verify that you want to delete the object.

4.5 Moving and Copying GIS Objects

Only objects on the active layer may be moved or copied. Any type of GIS object can be moved from one location to another. Lines, polylines, and polygons are moved with all their vertices stationary (i.e. their shape and orientation is unchanged).


To move a GIS point object:

1. Use the Layer list to make the layer in which the object is stored the active layer.
2. Select **Move Object** from the GIS menu, or click on the Move Object tool  on the GIS toolbar.


3. Position the mouse cross-hair over the object and drag the object to its new location while holding down the left mouse button. Release the mouse button to leave the object at its new location.
4. To **Copy** an object, hold down the *Shift* key while moving the object with the mouse.

You may also move point objects by interrogating them and selecting the Geo tab in the Object Attributes window. See section 3.3.6, *Editing GIS Objects*, for more information on using the **Object Attributes** window.

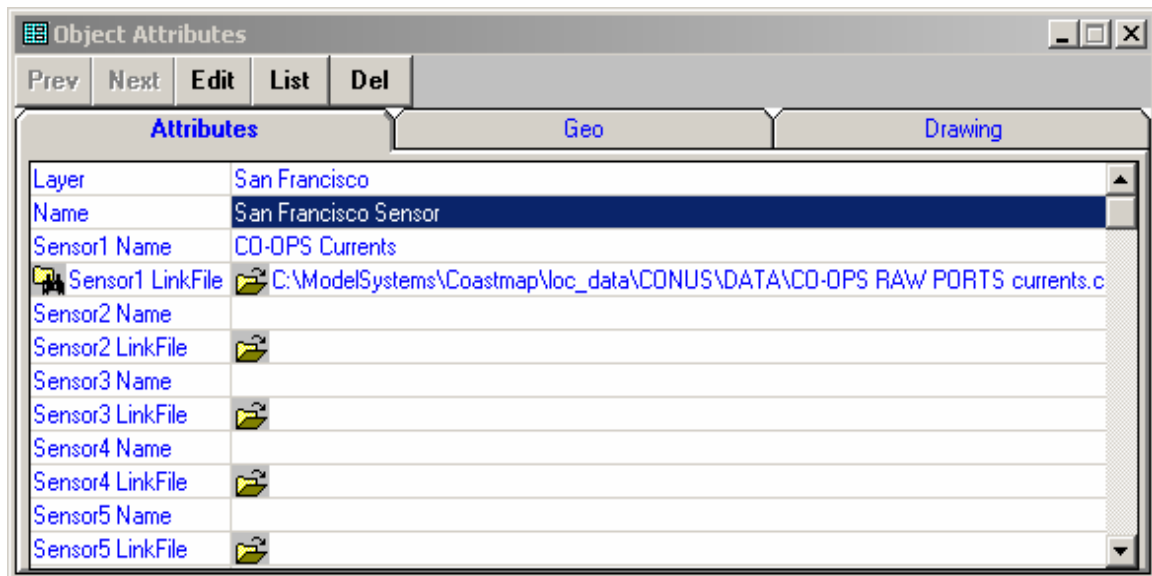
To move a GIS polyline or polygon vertex:

1. Use the Layer list to make the layer in which the object is stored the active layer.
2. Select **Edit Poly Vertices** from the GIS menu, or click on the Edit Polygon Nodes tool  from the GIS toolbar.
3. Position the mouse cross-hair over the polyline or polygon object. Click to select the object. The vertices will be highlighted.
4. Position the mouse cross-hair over the vertex to be moved and drag the vertex to its new location while holding down the mouse button. Release the mouse button to leave the vertex in the new location.
5. Repeat step 4 to move all desired vertices on the object.
6. Double-click the left mouse button to stop moving vertices. You will be asked whether you want to save your changes.

4.6 Editing GIS Objects

The attributes of any object shown on the map can be edited. In the Layer list check that the layer containing the objects to be edited is checked on. The objects do not need to be in the active layer. If the mouse cursor is not an arrow (indicating Interrogate mode), select the Interrogate GIS Object tool by clicking on the  button on the GIS toolbar.

Click on the object to be edited. The **Object Attributes** window will appear.



To edit any of the attribute data, click on the **Edit** button at the top of the window. This will bring up the editing window containing all the attribute data. New data can be entered in any of the fields.

If link file fields are available, link files can be added or deleted. Click on the **Link** button to the right of the Link File field in the editing window. Alternately, double-click on the Link File field in the **Object Attributes** window where the *Open File* icon appears. This will bring up a window showing the files currently linked with the object and allowing two options: *Add Link File* or *Remove Link File*. To remove a link file, first highlight the file to be removed and then click the **Remove Link File** button.

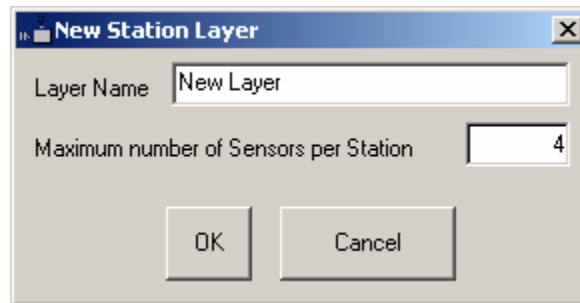
The **Geo** tab provides the longitude and latitude position of point objects and provides a **Move by Mouse** option for all object types.

To set a point object's position to a specific longitude and latitude, select the **Geo** tab and enter the desired longitude and latitude coordinates for the point. Click on the **Apply** button to save the object at the new position. For any object type, select **Move by Mouse** and the object will automatically be selected on the map and the cursor may be used to move the object to a new location.

5. Advanced Operations

5.1 How to Create a New Station Layer


1. Under the Coastmap menu, select **Add Station Layer**.
2. In the dialog which appears, enter a name for the layer and the maximum number of Sensors per Station on this layer.
3. Click **OK** to create the Station Layer.



5.2 How to Edit an Existing Station Layer

1. Right-click on the Station Layer's name in the Layer list and select **Layer Properties** from the pop-up menu.
OR
Left-click on the Station Layer's name in the Layer list to make it the active layer, and then choose **Layer Tools** from the GIS menu.
OR
Left-click on the Station Layer's name in the Layer list to make it the active layer, then push **CTRL-L** to bring up the **Layer Tools** window.
2. Make changes to the layer using the **Layer Tools** dialog (see section 3.3.3, *Editing GIS Layers* for more information).
3. Click **OK** to finish editing the layer.


5.3 How to Add a New Station to an Existing Station Layer

1. Make sure that the layer to which you want to add an object is turned on and is the active layer (denoted by a raised look).
2. From the GIS Menu, select the **Add Object** submenu, and select **Point Object**.
OR
Use the **Add GIS Point Object** tool  from the GIS toolbar.

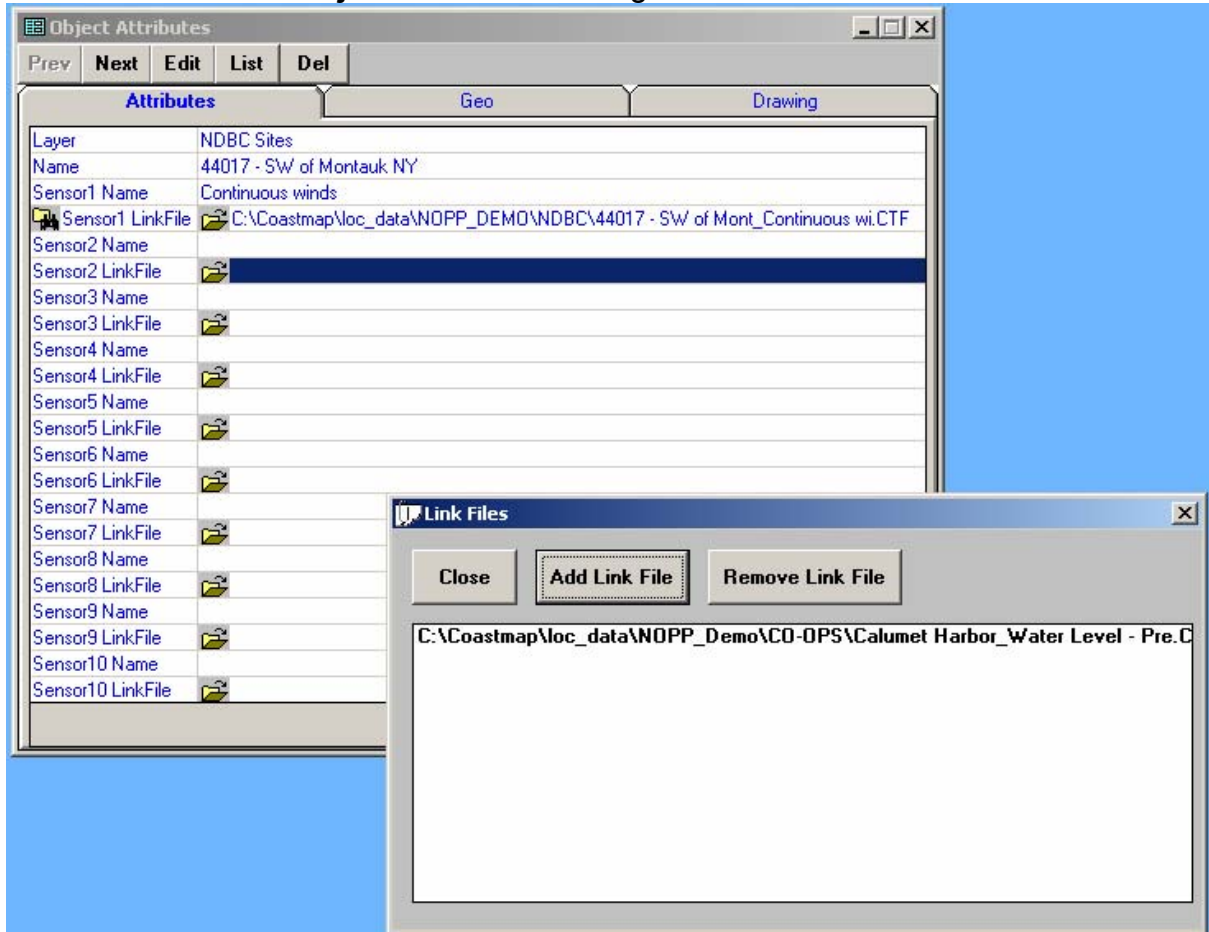
3. Click on the map to place the new Station object.
4. Specify the Station name in the **New Station** window.
5. Specify names and link files (if any) for Sensors at this Station.
6. If the exact coordinates (latitude and longitude) are known, you can enter them in the fields at the top.

7. To make the Station's name appear on the map:
 1. Edit the Station Layer (see section 4.2, *How to Edit an Existing Station Layer*)
 2. Check the **Labels On** checkbox.
 3. Click **OK**.
8. In the Coastmap menu, select **Refresh Station** to make the newly-created Station appear in the Station tree.


5.4 How to Link a File to an Existing Station

1. Select the **Interrogate GIS Objects** tool  from the GIS toolbar.
2. Click on the Station's icon on the map.

3. Double-click one of the **LinkFile** fields in the attributes grid to open the **Link Files** dialog.
4. Click **Add Link File**.
5. Select a file to link to this Sensor.
6. Click **Close**.
7. Close the **Object Attributes** dialog.




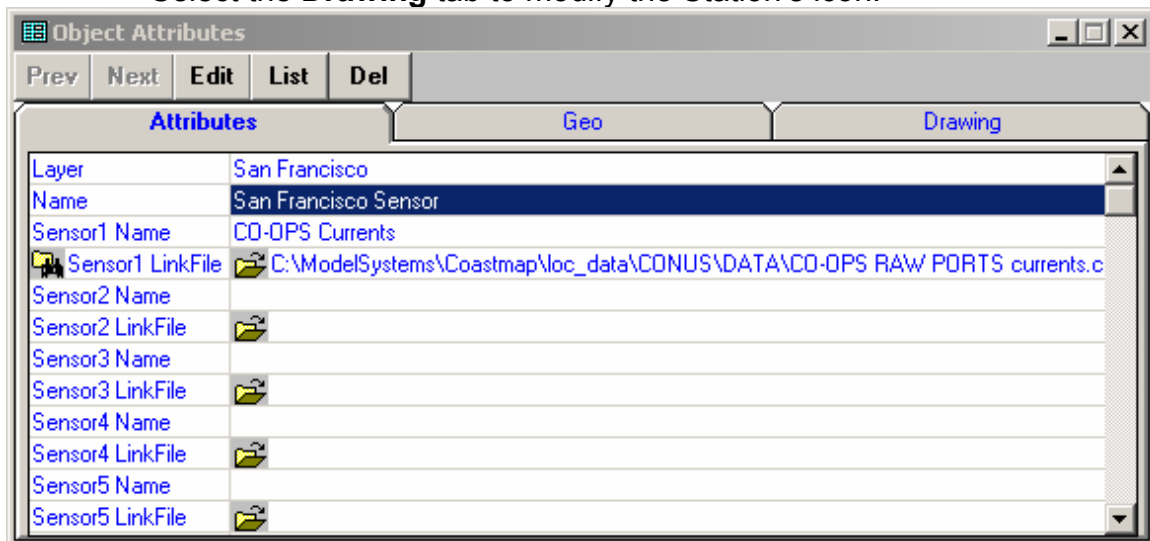
5.5 How to Remove a Linked File from an Existing Station

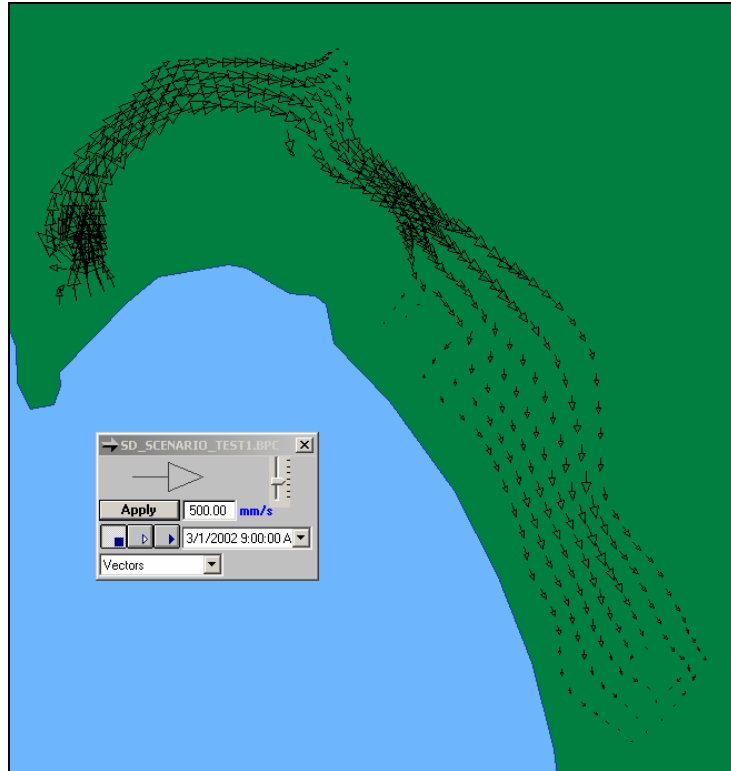
1. Select the **Interrogate GIS Objects** tool  from the GIS toolbar.
2. Click on the Station's icon on the map.
3. Double-click any of the **LinkFile** fields in the attributes grid to open the **Link File** dialog.

4. Select the linked file to remove.
5. Click **Remove Link File**.
6. Repeat until all desired linked files are removed.
7. Click **Close**.
8. Close the **Object Attributes** dialog.

5.7 How to Edit an Existing Station's Attributes

1. Select the **Interrogate GIS Objects** tool  from the GIS toolbar.
2. Click on the Station's icon on the map.
3. Double-click any of the attribute fields to change them.
OR
 Select the **Geo** tab to modify the Station's geographical attributes.
OR
 Select the **Drawing** tab to modify the Station's icon.





5.7 Coastmap Directory Structure and CTF files

Coastmap stores the data it uses in a variety of different locations and formats. For the most part these are transparent to the user, as Coastmap already knows where and how to store most data sets it handles, and most users will not need to know the details. However, for some purposes it will be helpful to understand the files and placement scheme that Coastmap uses.

CTF files are the main format used to store data sets. CTF is an ASCII format that includes metadata headers followed by data type headers and then a chronological time series. CTF files can be appended when more recent data becomes available, but once a CTF file is written it cannot be made to hold any new variables; a new file must be used to store additional data categories.

When Coastmap imports data over the Internet it reads them in and writes them to a CTF file. Depending on the data type, it stores the file in the appropriate folder in the current location directory, according to the following scheme:

Data from CO-OPS -----> [location]\CO-OPS

Data from NOAA PORTS (live or archived) -----→ [location]\PORTS
Data from US Geological Survey -----→ [location]\USGS
Data from Marine Data Buoys -----→ [location]\NDBC
Extratropical Storm Surge predictions -----→ [location]\ETSS

5.8.3 Binary File Storage Locations

Beside the CTF files used to store data series for things like tidal elevation, water quality, and meteorological data Coastmap also uses various binary file types, mainly to store data covering large areas. Examples include CDF and WIX wind files, TUV current files (made from CODAR data), BPC current files, BPV wave files, and DGR grids on which to view the latter two file types.

In general, Coastmap stores binary files according to the type of data they hold, and so files of the above types would be stored in the directories **[location]\WINDS**, **[location]\CURRENTS**, and **[location]\WAVES**, respectively.